

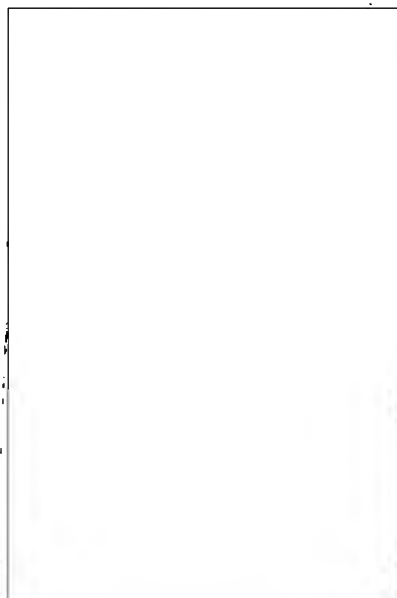
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NPBO Pre-Buy Condenser Pumps and
Chiller Specification Review

- a) The specification requires 4160 volt condenser water pump motors. Since two of the existing condenser water pumps are 480 volt, is this indicative of the fact all new electrical switchgear will be for 4160 volt motors?
- b) Chilled water pump specifications were not provided. However, if new chilled water pumps are purchased, they should have mechanical seals to preclude unnecessary water make-up to a closed system.
- c) Does the specification insure the most energy efficient chiller on the market will be obtained?
- d) Once these items are purchased, will they be stored (and where) or will they be installed in the Power Plant? If these units are to be installed, will this be accomplished under the new building contract?
- e) Does the chilled water temperature differential of 58°F to 42°F include the existing building requirements? Is the 42°F leaving temperature requirement based on new or existing building requirements or would a higher temperature (say 45°F) be acceptable.
- f) It is recommended that the GSA operating engineer technicians be allowed to review and comment on these specifications since they have "hands-on" experience with this type of equipment.

STAT



SH&G 1315 BP-3SC
CENTRAL INTELLIGENCE AGENCY
HEADQUARTERS EXPANSION
BID PACKAGE 3SC
SUPPLY CONTRACT - CHILLERS AND PUMPS

SECTION 15600 PAGE 1
DATE 10/21/83 TIME 17.526
CHILLERS

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- | | | |
|---|-----|---|
| 1 | 1) | 1. CONDENSER WATER PUMPS |
| 2 | 2) | GENERAL |
| 3 | 3) | FURNISH A TOTAL OF SEVEN (7) CONDENSER WATER PUMPS. |
| 3 | 4) | PUMPS SHALL HAVE THE CAPACITIES AND CHARACTERISTICS AS HEREINAFTER SPECIFIED. |
| 3 | 5) | |
| 3 | 6) | PUMP NAMEPLATES SHALL CONTAIN THE GPM AND HEAD AT THE SELECTION POINT. |
| | 7) | SINCE PUMP NAMEPLATE IS TO BE COVERED BY FIXED INSULATION, THE GPM AND |
| | 8) | HEAD AT THE SELECTION POINT SHALL ALSO BE INCLUDED IN THE MOTOR |
| | 9) | NAMEPLATE DATA. |
| 3 | 10) | FURNISH CERTIFIED PUMP CHARACTERISTIC CURVES WITH THE PUMPS SHOWING |
| | 11) | CAPACITIES, HEADS, EFFICIENCIES AND BRAKE HORSEPOWER THROUGHOUT THE |
| | 12) | ENTIRE RANGE OF THE PUMPS WHEN OPERATING SINGLY AND THRU THE RANGE OF |
| | 13) | THE ENTIRE SEVEN PUMPS OPERATING IN PARALLEL. |
| 3 | 14) | PUMPS SHALL BE SELECTED TO PERFORM THE SPECIFIC DUTY FOR WHICH THEY |
| | 15) | ARE INTENDED. |
| 3 | 16) | THE RATIO OF THE MAXIMUM PUMP IMPELLER DIAMETER TO THE SELECTED PUMP |
| | 17) | IMPELLER DIAMETER SHALL BE 1.15 OR GREATER. |
| 3 | 18) | PUMPS SHALL BE CHECKED FOR LUBRICATION, ALIGNMENT AND OPERATING |
| | 19) | CONDITIONS BY A FACTORY REPRESENTATIVE AFTER PUMPS HAVE BEEN SET, |
| | 20) | LEVELLED, GROUTED, CONNECTED TO PIPING, AND SYSTEM FILLED READY TO |
| | 21) | OPERATE. |
| 3 | 22) | PUMPS SHALL BE SELECTED TO OPERATE WITHIN TWO PERCENTAGE POINTS OF |
| | 23) | MAXIMUM EFFICIENCY ON THE IMPELLER CURVE SELECTED AND HAVE A MAXIMUM |
| | 24) | SUCTION VELOCITY OF EIGHT FEET PER SECOND. |
| 3 | 25) | NO POINT ON THE HEAD-CAPACITY CURVE SHALL EXCEED THE MOTOR HORSEPOWER |
| | 26) | SELECTED TO DRIVE THE PUMP. |
| 3 | 27) | MOTOR HORSEPOWER AT THE SELECTION POINT SHALL NOT EXCEED 95 PERCENT OF |
| | 28) | THE RATED MOTOR HORSEPOWER. |
| 3 | 29) | PUMPS SHALL BE DOUBLE SUCTION SPLIT CASE TYPE, MOTOR DRIVEN THRU A |
| | 30) | FLEXIBLE COUPLING, MOUNTED ON A COMMON ENCLOSED CAST IRON OR STEEL |
| | 31) | BASE SUITABLE FOR AND WITH ADEQUATE PROVISIONS FOR GROUTING. |
| 3 | 32) | PUMP CASINGS SHALL BE CLOSE GRAINED CAST IRON SUITABLE FOR 175 LB. |
| | 33) | WORKING PRESSURE WITH 125 LB. ANSI FLANGES. |
| 3 | 34) | THE PUMP VOLUTE SHALL BE SUPPLIED WITH PLUGGED VENT, DRAIN AND GAGE |
| | 35) | TAPPINGS. |
| 3 | 36) | PUMP SHAFTS SHALL BE OF STAINLESS STEEL. |
| 3 | 37) | BEARINGS SHALL BE REGREASABLE BALL TYPE. |
| 3 | 38) | IMPELLERS SHALL BE BRONZE, ENCLOSED DOUBLE SUCTION TYPE, KEYED TO |
| | 39) | SHAFT AND DYNAMICALLY BALANCED FOR QUIET OPERATION. |
| 3 | 40) | PUMPS SHALL BE EQUIPPED WITH PACKED STUFFING BOX CONSTRUCTION WITH A |
| | 41) | MINIMUM OF 4 RINGS OF PACKING PLUS A FLUSH RING TO PROVIDE PROPER |
| | 42) | FLUSH LUBRICATION. PUMPS SHALL BE EQUIPPED WITH SUITABLE DRIP PAN WITH |
| | 43) | TAPPED CONNECTION AND PIPING TO DRAIN. |

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- 3 44) PUMPS SHALL EACH HAVE A CAPACITY OF 4450 GPM AT A TOTAL DYNAMIC HEAD
45) OR 125 FEET WHEN DRIVEN AT 1750 RPM BY A 200 HORSEPOWER MOTOR.
- 3 46) PUMPS SHALL BE INGERSOLL-RAND WORTHINGTON; BUFFALO FORGE; AURORA;
47) PEERLESS; WEINMAN, OR AS APPROVED. (EQUIV.)
- 2 48) MOTORS
- 3 49) MOTORS SHALL CONFORM TO THE FOLLOWING STANDARDS AND REQUIREMENTS:
- 4 50) "AMERICAN STANDARDS FOR ROTATING ELECTRICAL MACHINERY, CSO",
51) AMERICAN NATIONAL STANDARDS INSTITUTE.
- 4 52) "AMERICAN STANDARD TERMINAL MARKINGS FOR ELECTRICAL APPARATUS
53) C6.1" AMERICAN NATIONAL STANDARDS INSTITUTE.
- 4 54) "NEMA STANDARDS FOR MOTORS AND GENERATORS", LATEST EDITION.
- 4 55) "AMERICAN STANDARD DEFINITIONS OF ELECTRICAL TERMS", AMERICAN
56) NATIONAL STANDARDS INSTITUTE.
- 3 57) THE MOTOR HORSEPOWER RATINGS SPECIFIED, SCHEDULED, OR SHOWN SHALL BE
58) UNDERSTOOD TO BE THE MINIMUM ACCEPTABLE AND THE INDICATED MOTOR SPEEDS
59) THE MAXIMUM ACCEPTABLE.
- 3 60) MOTORS SHALL BE SUITABLE FOR OPERATION ON 4160 VOLT, 3 PHASE, 60 HERTZ
61) ELECTRICAL SERVICE.
- 3 62) MOTORS SHALL BE NEMA RATED "U" FRAME. "T" FRAME MOTORS ARE NOT
63) ACCEPTABLE.
- 3 64) MOTORS SHALL BE GENERAL PURPOSE, SQUIRREL CAGE INDUCTION TYPE, DESIGN
65) "B", ACROSS-THE-LINE FULL VOLTAGE STARTING WITH MAXIMUM SLIP OF 5
66) PERCENT AND LOCKED ROTOR AND BREAKDOWN TORQUES AS DEFINED IN NEMA.
- 3 67) MOTORS SHALL BE OPEN, DRIP-PROOF NEMA CLASS B INSULATION, RATED 1.15
68) SERVICE FACTOR.
- 3 69) SPEED CLASSIFICATION SHALL BE AS INDICATED OR REQUIRED FOR THE SERVICE
70) AND IN ACCORD WITH THE ESTABLISHED NEMA STANDARDS SECTIONS MG1-1.15
71) THROUGH MG1-1.20.
- 3 72) MOTORS SHALL OPERATE SUCCESSFULLY AT RATED LOAD WITH MAXIMUM VOLTAGE
73) VARIATION OF PLUS OR MINUS 10 PERCENT AT RATED FREQUENCY.
- 3 74) MOTORS SHALL BE SIZED SO THAT THEIR DESIGN LOADS SHALL NOT EXCEED 95
75) PERCENT OF THEIR RATED LOADS.
- 3 76) MOTORS SHALL HAVE CODE LETTERS FOR LOCKED ROTOR KVA PER HORSEPOWER AS
77) DEFINED IN ACCORD WITH NEMA SECTION MG1-2.14.
- 3 78) MOTORS SHALL HAVE NAMEPLATES ATTACHED THERETO THAT SHALL GIVE MINIMUM
79) INFORMATION AS DEFINED IN NEMA SECTION MG1-2.15. WHENEVER THE MOTOR
80) NAMEPLATE IS NOT VISIBLE, A PLATE WITH DUPLICATE INFORMATION SHALL BE
81) PROVIDED WHERE IT CAN BE READILY SEEN. NAMEPLATES SHALL NOT BE REMOVED
82) FROM MOTOR.
- 3 83) MOTOR ACCESSORIES SHALL INCLUDE:
- 4 84) GREASE LUBRICATED BEARINGS.
- 4 85) TYPE OF MOUNTING AS REQUIRED WITH STANDARD DIMENSIONS IN ACCORD
86) WITH NEMA SECTION MG1-PART 3.
- 4 87) JUNCTION BOX OF ADEQUATE SIZE TO TERMINATE THE INDICATED CONDUIT
88) AND WIRE. SPECIAL BOX EXTENSIONS SHALL BE PROVIDED IF NECESSARY.
89) JUNCTION BOX SHALL HAVE A SEPARATE LUG FOR GROUND CONNECTION.

2455 10-14
4160 10-14
OF 4160 Volts

3126 13123 07-33C
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SUPPLY CONTRACT - CHILLERS AND PUMPS

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- 4 90) SOLDERLESS CONNECTORS USED ON ALL MOTOR LEADS.
- 3 91) MOTOR COMPARTMENTS SHALL BE CLEAN AND DRY AND ADEQUATELY VENTED
92) DIRECTLY TO THE EXTERIOR.
- 3 93) MOTORS SHALL BE AS MANUFACTURED BY DELCO; LIMA; REULAND; GENERAL
94) ELECTRIC; ELECTRIC APPARATUS; OR AS APPROVED.
- 3 95) A LOAD TEST SHALL BE CONDUCTED ON ALL MOTORS AND THE CURRENT READINGS
96) TAKEN. UNDER NO CONDITION SHALL THE LOAD CURRENT EXCEED THE NAMEPLATE
97) RATING OF THE MOTOR. IF THIS CONDITION EXISTS, THE CONTRACTING OFFICER
98) SHALL BE NOTIFIED IMMEDIATELY.
- 1 99) 2. CENTRAL LIQUID CHILLER REFRIGERATION MACHINES
- 2 100) FURNISH FIVE (5) CENTRIFUGAL LIQUID CHILLER UNITS, WITH SPECIFIED
101) ACCESSORIES. YORK MODEL HT, CARRIER MODEL CB OR TRANE MODEL CVHE. *approved special*
- 2 102) FOR OPERATING ECONOMY, THE CHILLERS SHALL BE CAPABLE OF STARTING AND
103) OPERATING AT PART LOAD WITH THE ENTERING CONDENSER WATER TEMPERATURE AS
104) LOW AS THE ENTERING CHILLED WATER TEMPERATURE. IF THE CHILLER IS
105) INCAPABLE OF MEETING THIS REQUIREMENT, THE CHILLER MANUFACTURER SHALL
106) SUPPLY A THREE-WAY COOLING TOWER BYPASS VALVE, WHICH WILL BE INSTALLED BY
107) THE INSTALLING CONTRACTOR.
- 2 108) EACH UNIT SHALL BE A COMPLETE FACTORY PACKAGE INCLUDING A CENTRIFUGAL
109) COMPRESSOR, OPEN OR HERMETIC MOTOR, COMPRESSOR MOTOR STARTER, COOLER,
110) CONDENSER AND PURGE OR PUMPOUT UNIT. UNIT SHALL BE FACTORY ASSEMBLED,
111) PIPED, WIRED AND LEAK TESTED. IF THE MANUFACTURER DOES NOT PROVIDE A UNIT
112) AS A COMPLETE FACTORY PACKAGE, THE INSTALLING CONTRACTOR WILL FURNISH THE
113) NECESSARY LABOR AND MATERIAL TO COMPLETE THE ASSEMBLY WITH THE
114) SUPERVISION OF THE MANUFACTURER'S REPRESENTATIVE. MANUFACTURER OF CHILLER
115) SHALL HAVE A FACTORY MAINTAINED SERVICE ORGANIZATION AND REPAIR PARTS
116) STOCK WITHIN THE AREA.
- 2 117) EVAPORATOR AND CONDENSER SHALL BE OF SHELL AND TUBE TYPE DESIGN IN
118) ACCORDANCE WITH REQUIREMENTS OF THE ASME CODE FOR UNFIRED PRESSURE
119) VESSELS. REFRIGERANT SIDE SHALL BE PROOF-TESTED PER APPLICABLE CODE OR AT
120) 1.5 TIMES MAXIMUM DESIGN WORKING PRESSURE BUT NOT LESS THAN 45 PSIG. A
121) SAFETY RUPTURE DISC IN ACCORDANCE WITH ANSI/ASHRAE 15-1978 SAFETY CODE
122) SHALL BE PROVIDED FOR THE REFRIGERANT CIRCUIT.
- 2 123) EACH TUBE SHALL BE INTEGRAL, EXTERNALLY FINNED, 3/4-INCH NOMINAL
124) DIAMETER, SEAMLESS COPPER WITH SMOOTH LANDS AT ALL TUBE SUPPORTS. TUBES
125) SHALL BE INDIVIDUALLY REPLACEABLE WITH TUBE ENDS ROLLED INTO ANNULAR
126) GROOVES IN THE TUBE SHEETS. EACH EVAPORATOR TUBE SHALL BE ROLLED INTO THE
127) INTERMEDIATE SUPPORT SHEETS.
- 2 128) WATER BOXES SHALL BE DESIGNED FOR 150 PSIG MAXIMUM WORKING PRESSURE.
129) WATER SIDE SHALL BE HYDROSTATICALLY TESTED AT 1.5 TIMES WORKING PRESSURE.
130) WATER BOXES SHALL BE THE REMOVABLE, COMPACT TYPE WITH STUB OUT WATER
131) CONNECTIONS HAVING VICTAULIC GROOVES. CONDENSER WATER BOXES SHALL BE
132) HINGED. TAPS FOR VENTS AND DRAINS SHALL BE PROVIDED.
- 2 133) EVAPORATOR SHALL HAVE ELIMINATORS INSTALLED ALONG ITS COMPLETE LENGTH
134) ABOVE THE TUBES TO PREVENT LIQUID REFRIGERANT FROM ENTERING THE
135) COMPRESSOR.
- 2 136) LIQUID REFRIGERANT ENTERING EVAPORATOR SHALL BE DISTRIBUTED UNIFORMLY THE
137) ENTIRE LENGTH OF SHELL AND WITHOUT DIRECT IMPINGEMENT OF HIGH VELOCITY
138) REFRIGERANT ON TUBES.
- 2 139) FOR STANDARD WATER SELECTIONS, MINIMUM ALLOWABLE REFRIGERANT TEMPERATURE
140) SHALL BE 32 F. AT THE DESIGN CONDITIONS HEREINAFTER SPECIFIED.

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- 2 141) RELIEF DEVICES SHALL BE PROVIDED FOR THE REFRIGERANT SIDE, IN ACCORDANCE
142) WITH ANSI B9.1 SAFETY CODE AND LOCAL CODE. MULTIPLE RELIEF DEVICES SHALL
143) BE BROUGHT TO A COMMON VENT CONNECTION.
- 2 144) COMPRESSOR SHALL BE OF THE CENTRIFUGAL TYPE, DIRECT DRIVEN AT A MAXIMUM
145) SPEED OF 3600 RPM.
- 2 146) COMPRESSOR IMPELLERS SHALL BE HIGH STRENGTH ALUMINUM ALLOY, BALANCED BOTH
147) STATICALLY AND DYNAMICALLY. IMPELLER SHALL BE PROOF-TESTED AT LEAST 15
148) PERCENT ABOVE DESIGN OPERATING SPEED.
- 2 149) COMPRESSOR ASSEMBLY SHALL BE RUN-TESTED AT THE FACTORY. VIBRATION SHALL
150) NOT EXCEED 1.0 MIL AT THE COMPRESSOR HOUSING.
- 2 151) CAPACITY CONTROL SHALL BE BY VARIABLE INLET GUIDE VANES, CAPABLE OF
152) MODULATING PERFORMANCE FROM 10 PERCENT TO 100 PERCENT RATED UNIT CAPACITY
153) AT DESIGN CONDITIONS. SINGLE-STAGE UNITS, OR TWO-STAGE UNITS WITH INLET
154) VANES IN FRONT OF ONLY ONE STAGE OF COMPRESSION, SHALL ALSO INCLUDE
155) AUTOMATIC HOT GAS BYPASS TO ALLOW OPERATION AT 10 PERCENT LOAD.
- 2 156) MOTOR SHALL BE 2-POLE, CONTINUOUS DUTY, SQUIRREL CAGE INDUCTION TYPE, AND
157) SHALL HAVE AN OPEN DRIP-PROOF OR HERMETIC DESIGN ENCLOSURE. MOTOR
158) FULL-LOAD AMPERES (FLA) AT DESIGN CONDITIONS SHALL NOT EXCEED MOTOR
159) NAMEPLATE FLA. MOTOR SHALL BE FACTORY MOUNTED AND ALIGNED WITH THE
160) COMPRESSOR. MOTOR SHALL BE DESIGNED FOR USE WITH THE TYPE STARTER
161) SPECIFIED.
- 2 162) A POSITIVE DISPLACEMENT SUBMERGED OIL PUMP SHALL PROVIDE LUBRICATION TO
163) ALL PARTS REQUIRING OIL. PROVISIONS SHALL BE INCLUDED FOR CONTROLLED
164) HEATING OF OIL. HEATER SHALL BE SELECTED TO MAINTAIN OIL AT SUFFICIENT
165) LEVEL TO MINIMIZE AFFINITY FOR REFRIGERANT. THE OIL PUMP SHALL BE
166) SUITABLE FOR OPERATION ON 120-VOLT SINGLE PHASE POWER. THIS POWER SHALL
167) BE SUPPLIED THROUGH THE CONTROL POWER TRANSFORMER.
- 2 168) A REFRIGERANT OR WATER COOLED OIL COOLER SHALL BE PROVIDED. IF THE OIL
169) COOLER IS WATER COOLED THE INSTALLING CONTRACTOR ^{WILL} FURNISH AND INSTALL
170) NECESSARY AUXILIARY WATER PIPING, VALVES AND CONTROLS TO THE OIL COOLER.
171) COMPLETE LUBRICATION SYSTEM SHALL BE FACTORY INSTALLED AND PIPED.
- 2 172) METHOD OF SENSING MOTOR WINDING TEMPERATURE OF EACH PHASE SHALL BE
173) PROVIDED. THIS DEVICE SHALL INDEPENDENTLY STOP THE COMPRESSOR MOTOR IF
174) EXCESSIVE TEMPERATURE IS SENSED IN ANY OF THE THREE WINDINGS.
- 2 175) INHERENT LOW VOLTAGE PROTECTION SHALL BE PROVIDED.
- 2 176) INHERENT SINGLE-PHASE PROTECTION (PHASE FAILURE) SHALL BE PROVIDED. THIS
177) MAY BE THE SAME DEVICE WHICH PROVIDES MOTOR OVERLOAD PROTECTION. IT SHALL
178) STOP THE COMPRESSOR MOTOR IF ANY PHASE EXCEEDS ITS OVERLOAD TRIP SETTING.
- 2 179) UNITS THAT OPERATE AT SUB-ATMOSPHERIC PRESSURE (R-11, R-113, R-114) SHALL
180) BE PROVIDED WITH A COMPLETE PURGE UNIT, PROVIDING POSITIVE MEANS FOR
181) COLLECTION, RETURN OF REFRIGERANT AND REMOVAL OF NON-CONDENSABLES. A
182) SIGNAL LIGHT ON THE CONTROL CENTER SHALL BE PROVIDED WHICH WILL ALERT THE
183) OPERATOR AT OCCURRENCE OF EXCESSIVE PURGING, INDICATING AN ABNORMAL AIR
184) LEAK INTO THE UNIT.
- 2 185) PURGE UNIT SHALL BE PROVIDED WITH THE FOLLOWING:
- 7 186) SIGHT GLASS OIL LEVEL INDICATOR.
- 7 187) ELECTRICALLY HEATED OIL SEPARATOR.
- 7 188) SECTIONALIZED DRUM PERMITTING SEPARATION OF NONCONDENSABLE
189) GASES AND WATER FROM DISCHARGE OF COMPRESSOR PURGE.
- 7 190) MEANS FOR RETURNING REFRIGERANT TO EVAPORATOR AND FOR
191) DRAWING OFF NONCONDENSABLES.

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CENTRAL INTELLIGENCE AGENCY
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B10 PACKAGE 3SC
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CHILLERS

- 7 192) SOLENOID VALVE TO AUTOMATICALLY ISOLATE PURGE SYSTEM
193) FROM CENTRIFUGAL MACHINE WHEN PURGE COMPRESSOR IS NOT
194) IN OPERATION.
- 7 195) WATER CONNECTIONS TO ALLOW OPERATION OF THE PURGE
196) SYSTEM WHEN CENTRIFUGAL MACHINE IS NOT IN OPERATION.
- 2 197) UNITS THAT OPERATE ABOVE 15 PSIG (R12, R-22, R-500) SHALL BE PROVIDED
198) WITH A SEPARATE COMPRESSOR OPERATED TRANSFER UNIT AND SEPARATE STORAGE
199) RECEIVER TO PERMIT REMOVAL AND ISOLATION OF THE FULL REFRIGERANT CHARGE
200) ALLOWING INTERNAL INSPECTION OF THE CONDENSER, EVAPORATOR AND CENTRIFUGAL
201) COMPRESSOR. THE STORAGE RECEIVER SHALL BE ASME CODE CONSTRUCTED AND
202) STAMPED, AND FURNISHED WITH ANSI B9.1 SAFETY CODE AND LOCAL CODE. PUMPOUT
203) SYSTEM SHALL BE SUPPLIED AND WARRANTED BY THE CENTRIFUGAL MACHINE
204) MANUFACTURER. IT SHALL BE PRE-PIPED AND PRE-WIRED COMPLETE WITH FUSED
205) DISCONNECT, STARTER AND CONTROLS HOUSED IN A NEMA 1 ENCLOSURE. EACH UNIT
206) SHALL HAVE ITS OWN COMPLETE PUMP-OUT SYSTEM. THE INSTALLING CONTRACTOR
207) WILL FURNISH AND INSTALL NECESSARY AUXILIARY WATER PIPING AND VALVES TO
208) TRANSFER UNIT CONDENSER.
- 2 209) EACH CHILLER SHALL BE EQUIPPED WITH AN ELECTRIC CONTROL PANEL AND INCLUDE
210) THE FOLLOWING.
- 3 211) THREE-PHASE ELECTRONIC CURRENT LIMITING WITH INDIVIDUAL CURRENT
212) TRANSFORMERS.
- 4 213) ELECTRONIC CURRENT LIMITER SHALL LIMIT THE MAXIMUM AMPERAGE DRAWN
214) BY THE COMPRESSOR MOTOR BY MONITORING ALL THREE PHASES OF SUPPLY
215) POWER. THE INLET GUIDE VANES SHALL MODULATE IN RESPONSE TO THE
216) MAXIMUM AMPERAGE DRAWN BY ANY ONE OF THE THREE PHASES.
- 4 217) CONTINUOUS VARIABLE POSITION DEMAND LIMITER SHALL PERMIT MANUAL
218) CONTROL OF POWER DEMAND AT ALL OPERATING POINTS FROM 40 TO 100
219) PERCENT OF FULL LOAD POWER.
- 3 220) ELECTRONIC CAPACITY CONTROL
- 4 221) SELF-CONTAINED ELECTRIC TEMPERATURE CONTROL SYSTEM, INCLUDING
222) TEMPERATURE SENSOR, VANE ACTUATOR AND INTEGRATED CIRCUIT
223) MICROPROCESSOR.
- 4 224) PRECISE CONTROL OF DEADBAND RANGE SHALL BE FIELD ADJUSTABLE FROM
225) PLUS OR MINUS 1/4 DEG. F TO PLUS OR MINUS 1-1/2 DEG. F.
- 4 226) PRECISE CONTROL OF RATE AT WHICH THE CHILLER IS ALLOWED TO LOAD
227) (RAMP FUNCTION) SHALL BE FIELD ADJUSTABLE FROM TWO TO 45 MINUTES.
- 4 228) UNIT MICROPROCESSOR SHALL INCLUDE A MANUAL FOUR-POSITION (HOLD,
229) LOAD, UNLOAD OR AUTOMATIC) DIAGNOSTIC SWITCH FOR EASE OF
230) MAINTENANCE.
- 4 231) INDIVIDUAL LIGHTS SHALL INDICATE WHEN MACHINE IS LOADING,
232) UNLOADING, OR IF AUTOMATIC-CURRENT LIMITING IS OCCURRING.
- 4 233) LOW REFRIGERANT TEMPERATURE OVERRIDE TO AUTOMATICALLY CLOSE THE
234) GUIDE VANES AND UNLOAD THE COMPRESSOR IF LOW REFRIGERANT
235) TEMPERATURE IS DETECTED.
- 4 236) A METHOD TO MAINTAIN CAPACITY INLET GUIDE VANES IN CLOSED POSITION
237) DURING COMPRESSOR START-UP.
- 4 238) ANTIRECYCLE TIMER TO ENSURE 30-MINUTE INTERVAL BETWEEN SUCCESSIVE
239) COMPRESSOR MOTOR STARTS.
- 4 240) INDIVIDUAL, FRONT ADJUSTABLE GAUGES TO INDICATE CONDENSER,
241) EVAPORATOR, OIL AND PURGE DRUM PRESSURES. GAUGES SHALL BE SCALED IN
242) ENGLISH AND METRIC UNITS. GAUGES SHALL BE ORIFICED TO PREVENT
243) EXCESSIVE SENSITIVITY AND MOVEMENT OF GAUGE INDICATORS.

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- 4 244) CAM TIMER TO PROVIDE OPERATION OF OIL PUMP DURING PRELUBE AND
245) POST-LUBE CYCLES.
- 4 246) SWITCH TO PERMIT MANUAL OR AUTOMATIC OPERATION OF THE PURGE SYSTEM.
- 4 247) SAFETY CONTROLS WIRED IN THE MAIN CONTROL POWER CIRCUIT TO THE
248) STARTER. LOW EVAPORATOR TEMPERATURE, HIGH CONDENSER PRESSURE, HIGH
249) MOTOR TEMPERATURE AND LOW OIL PRESSURE CONTROLS SHALL BE WIRED TO
250) INDEPENDENTLY STOP THE COMPRESSOR MOTOR. ADDITIONALLY, EACH OF
251) THESE CONTROLS SHALL BE WIRED THROUGH A FAULT TRIP INDICATOR TO
252) PROVIDE A DOUBLE BREAK OF ALL SAFETY LOCKOUT SYSTEMS. METHOD TO
253) PROVIDE FIRST-OUT INDICATION OF FAULT SHALL BE PROVIDED. MANUAL
254) RESET OF EACH FAULT TRIP INDICATOR SHALL BE REQUIRED.
- 4 255) STARTER PANEL FAULTS DETECTED AND A FAULT TRIP INDICATOR WIRED TO
256) STOP THE COMPRESSOR MOTOR. MANUAL RESET SHALL BE REQUIRED.
- 4 257) ONE ADDITIONAL SET OF NORMALLY CLOSED CONTACTS (CONVERTIBLE TO
258) NORMALLY OPEN CONTACTS ON EACH FAULT TRIP INDICATOR) TO ALLOW
259) REMOTE ANNUNCIATION OF EACH OF THE FOLLOWING CONDITIONS: LOW
260) EVAPORATOR TEMPERATURE, HIGH CONDENSER PRESSURE, HIGH MOTOR
261) TEMPERATURE, LOW OIL PRESSURE AND STARTER FAULT.
- 4 262) 120-VOLT POWER SUPPLIES INDIVIDUALLY FUSED AND INCLUDING: CONTROL
263) CIRCUIT, OIL PUMP SYSTEM CIRCUIT, OIL HEATER CIRCUIT AND PURGE
264) CIRCUIT.
- 4 265) FACTORY INSTALLED CONTROL PANEL LIGHTS TO INDICATE SEQUENTIAL
266) START-UP AND OPERATION OF THE CHILLER, INCLUDING: SAFETIES,
267) SATISFIED, COOLING REQUIRED, RESTART TIME ELAPSED, CHILLED WATER
268) PUMP, CONDENSER WATER PUMP, OIL PUMP AND SYSTEM. PROVIDE ELAPSED
269) TIME METER AND STARTS COUNTER.
- 4 270) CAPABILITY OF INTERFACING WITH TYPICAL BUILDING ENERGY MANAGEMENT
271) SYSTEMS (DIRECT CURRENT LOAD SHED SIGNALS) TO REDUCE TOTAL
272) ELECTRICAL DEMAND.
- 4 273) CAPACITY CONTROL MECHANISM WHICH PROVIDES UNLOADED START-UP AFTER
274) POWER FAILURE.
- 2 275) EACH UNIT SHALL BE FACTORY ANTI-SWEAT INSULATED WITH FLEXIBLE CLOSED CELL
276) INSULATION. INSULATION SHALL BE APPLIED TO THE COOLER PORTION OF THE
277) SHELL AT MINIMUM THICKNESS 3/4 INCH. THE SAME TYPE INSULATION SHALL BE
278) APPLIED TO COMPRESSOR SUCTION PIPING AND OTHER REFRIGERANT PIPING AS
279) NECESSARY.
- 2 280) THE UNIT MANUFACTURER SHALL FURNISH THE COMPLETE INITIAL CHARGE OF
281) REFRIGERANT AND LUBRICATING OIL, CHILLED WATER AND CONDENSER WATER FLOW
282) SWITCHES, AND FOUR VIBRATION ISOLATION MOUNTS CONSISTING OF 5/8 INCH
283) STEEL MOUNTING PLATES WITH 1 INCH THICK NEOPRENE ISOLATION PADS.
- 2 284) REMOTE MOUNTED STARTERS
- 3 285) COMPRESSOR MOTOR STARTER SHALL BE SUPPLIED BY THE CENTRIFUGAL CHILLER
286) MANUFACTURER. STARTER SHALL BE A 5 KV FULL VOLTAGE TYPE ENCLOSED IN A
287) FREE STANDING NEMA-1 ENCLOSURE.
- 3 288) THE STARTER PANEL DOOR SHALL BE HINGED AND SHALL BE CAPABLE OF BEING
289) PADLOCKED TO PREVENT ACCESS BY UNAUTHORIZED PERSONNEL.
- 3 290) THE AMBIENT TEMPERATURE INSIDE THE STARTER PANEL SHALL NOT EXCEED 155
291) DEG. F (67 DEG. C) WITH ALL COMPONENTS ENERGIZED AT RATED LOAD
292) CONDITIONS AND 104 DEG. F (40 DEG. C) AMBIENT OUTSIDE THE STARTER
293) PANEL. TEMPERATURE RISE OF COMPONENTS SHALL BE PER RELATED NEC, NEMA
294) AND UL CODES.

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- 3 295) A PERMANENT NAMEPLATE SHALL BE PROVIDED AND MOUNTED ON THE STARTER
296) PANEL. IT SHALL IDENTIFY THE MANUFACTURER, SERIAL OR MODEL NUMBER
297) IDENTIFYING THE DATE OF MANUFACTURE AND COMPONENT REPLACEMENT PARTS
298) AND ALL CURRENT AND VOLTAGE RATINGS.
- 4 299) THE ELECTRONIC OVERLOAD SYSTEM SHALL BE COORDINATED WITH THE
300) COMPRESSOR MOTOR AND FACTORY SET AND LABELED WITH THE COMPRESSOR
301) MOTOR RATED LOAD AMPS (RLA), LOCKED ROTOR AMPS (LRA) AND OVERLOAD
302) TRIP (OLT) SETTINGS.
- 4 303) THE ELECTRONIC OVERLOAD SYSTEM SHALL PROVIDE:
- 5 304) EXCESSIVE LOCKED ROTOR CURRENT PROTECTION.
- 5 305) EXCESSIVE LOCKED ROTOR TIME PROTECTION.
- 5 306) CURRENT CONTROL OF TRANSITION FROM START TO RUN CONFIGURATION.
- 5 307) MAXIMUM CURRENT PROTECTION TO PREVENT THE COMPRESSOR MOTOR FROM
308) EXCEEDING ITS OLT SETTING.
- 5 309) PROTECTION OF EQUIPMENT AGAINST TRANSITION RESISTOR FAILURE.
- 5 310) A FAULT TRIP INDICATOR, "MOTOR OVERLOAD" SHALL BE LOCATED IN
311) THE DOOR OF THE STARTER PANEL ENCLOSURE. THIS FAULT INDICATOR
312) SHALL BE DISPLAYED IF ANY OF THE ABOVE CONDITIONS ARE SENSED AND
313) SHALL CAUSE THE MACHINE TO BE SHUT DOWN. THIS FAULT SHALL
314) REQUIRE MANUAL RESET. ELECTRONIC DIGITAL TIMING SHALL BE
315) PROVIDED BY THE OVERLOAD SYSTEM FOR REPEATABILITY AND ACCURACY.
- 4 316) THE ELECTRONIC, THREE-PHASE OVERLOAD SYSTEM SHALL BE FIELD
317) ADJUSTABLE FOR PURPOSES OF COORDINATION WITH OTHER ELECTRICAL
318) PROTECTION DEVICES.
- 3 319) TO PREVENT THE INCREASINGLY COMMON RAPID RECLOSURE FEATURE OF UTILITY
320) POWER DISTRIBUTION SYSTEMS FROM ADVERSELY AFFECTING THE MECHANICAL AND
321) POWER DRIVE EQUIPMENT, DISTRIBUTION FAULT PROTECTION SHALL BE
322) PROVIDED.
- 4 323) THE DISTRIBUTION FAULT PROTECTION SHALL CONSIST OF THREE-PHASE
324) CURRENT SENSING AND MONITORING THE STATUS OF THE STARTER. IF A
325) DISTRIBUTION FAULT IS DETECTED, THE FAULT TRIP INDICATOR
326) "DISTRIBUTION FAULT" SHALL BE DISPLAYED AND MANUAL RESET SHALL BE
327) REQUIRED. DISTRIBUTION FAULTS OF 1-1/2 ELECTRICAL CYCLES DURATION
328) SHALL BE DETECTED AND THE COMPRESSOR MOTOR SHALL BE DISCONNECTED
329) WITHIN SIX ELECTRICAL CYCLES.
- 3 330) POWER SUPPLY TERMINALS SHALL BE IDENTIFIED BY PERMANENT MARKERS. THE
331) MAXIMUM TEMPERATURE OF TERMINALS SHALL NOT EXCEED 167 DEG. F (75 DEG.
332) C) WHEN THE EQUIPMENT IS TESTED IN ACCORDANCE WITH ITS RATING.
- 3 333) CONTACTORS SHALL BE UL RECOGNIZED FOR AIR CONDITIONING AND
334) REFRIGERATION (DEFINITE PURPOSE) USE. THEY SHALL BE RATED IN VOLTAGE,
335) CONTINUOUS RATED LOAD AMPERES (RLA) AND LOCKED ROTOR AMPERES (LRA).
336) THE RATING SHALL EQUAL TO OR GREATER THAN THE REQUIREMENTS SPECIFIED
337) ON THE COMPRESSOR MOTOR NAMEPLATE.
- 3 338) ALL WIRES, BUS BARS AND FITTINGS SHALL BE COPPER ONLY, EXCEPT THE
339) INTERNAL WIRE OF THE CONTROL TRANSFORMER WHICH MAY BE ALUMINUM IF
340) COPPER TERMINATION IS PROVIDED.
- 3 341) DISCONNECTING MEANS IN THE FORM OF A NON-LOAD BREAK, HIGH INTERRUPTING
342) CAPACITY, FUSED DISCONNECT SHALL BE PROVIDED.
- 3 343) A 120-VOLT SINGLE-PHASE POWER SUPPLY SHALL BE DEVELOPED WITHIN THE
344) THREE-PHASE COMPRESSOR MOTOR STARTER AND SHALL BE IN ACCORDANCE WITH
345) THE CHILLER MANUFACTURER'S SPECIFICATIONS.

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- 3 346) THE STARTER SHALL BE EQUIPPED WITH TWO "PILOT" RELAYS TO INITIATE
347) THE MAIN CENTRIFUGAL STARTER SEQUENCE. THESE RELAYS SHALL BE A
348) SELF-MONITORING SAFETY CIRCUIT WHICH SHALL INDICATE IMPROPER OPERATION
349) (SLOW OPERATION, WELDING OF CONTACTS, ETC.) AND SHALL CAUSE THE UNIT
350) TO BE SHUT DOWN AND A FAULT TRIP INDICATOR TO BE DISPLAYED. THE
351) "STARTER CIRCUIT FAULT" INDICATOR SHALL BE LOCATED IN THE DOOR OF
352) THE ENCLOSURE AND SHALL REQUIRE MANUFAL RESET.
- 3 353) A LOCKOUT TRANSITION SAFETY CIRCUIT SHALL BE PROVIDED TO PREVENT
354) DAMAGE FROM PROLONGED ENERGIZATION DUE TO MALFUNCTION OF THE
355) TRANSITION CONTACTOR. MALFUNCTION SHALL CAUSE THE MACHINE TO BE SHUT
356) DOWN AND THE "STARTER CIRCUIT FAULT" INDICATOR TO BE DISPLAYED.
- 3 357) THE ELECTRONIC, THREE-PHASE OVERLOAD SYSTEM SHALL PROVIDE PROTECTION
358) TO THE COMPRESSOR MOTOR.
- 4 359) THE OVERLOAD SYSTEM SHALL BE COORDINATED WITH THE CURRENT CONTROL
360) SYSTEM TO PROVIDE FAIL-SAFE CIRCUITRY. A SINGLE ADJUSTMENT SHALL BE
361) USED TO SET ALL THREE OVERLOADS AND THE CURRENT CONTROL SIGNAL. ALL
362) THREE PHASES SHALL BE MONITORED AND THE HIGHEST OUTPUT SHALL BE
363) USED IN THE OVERLOAD AND CURRENT CONTROL SYSTEMS.
- 3 364) TERMINAL CONNECTION PADS SHALL BE PROVIDED TO WHICH CUSTOMER APPLIED
365) LUGS CAN BE ATTACHED. PROVIDE SUFFICIENT SPACE FOR STRESS CONE
366) TERMINATION.
- 3 367) PROVIDE THREE (3) AMMETERS CALIBRATED FOR INDICATING INRUSH CURRENT.
- 3 368) PROVIDE GROUND FAULT PROTECTION. A CIRCUIT BREAKER SHALL TRIP WHEN THE
369) DIELECTRIC RESISTANCE IS SIGNIFICANTLY REDUCED IN EITHER THE STARTER
370) OR COMPRESSOR MOTOR. INDICATION AND RESET SHALL BE LOCATED IN THE
371) STARTER DOOR.
- 2 372) CAPACITY
- 3 373) EACH UNIT SHALL HAVE A CAPACITY OF 1600 TONS OF REFRIGERATION,
374) DELIVERING 2400 GPM OF CHILLED WATER COOLED FROM 58 DEG F. TO 42 DEG
375) F. WHEN SUPPLIED WITH 4800 GPM OF CONDENSER WATER AT 85 DEG F. WITH A
376) 10 DEG F. TEMPERATURE RISE.
- 3 377) CONDENSER AND CHILLER SIDE FOULING FACTORS SHALL BE .0005.
- 3 378) THREE-PASS CHILLER PRESSURE DROP SHALL NOT EXCEED 43 FT. OF WATER AND
379) TWO-PASS CONDENSER PRESSURE DROP SHALL NOT EXCEED 25 FT. OF WATER.
- 3 380) COMPRESSOR MOTOR ^{KW} OPERATING ^{ON} 4160 VOLTS SHALL HAVE BE A MAXIMUM OF
381) 1109, WITH A MAXIMUM MOTOR DESIGN KW OF 1180. DESIGN RLA SHALL BE 184
382) AND LRA 925.
- 2 383) FACTORY RUN-IN TEST
- 3 384) EACH CHILLER SHALL BE PRE-ASSEMBLED AT THE FACTORY AND THE COMPRESSOR
385) SHALL BE GIVEN A RUN-IN-TEST ON AIR. THE ENTIRE UNIT SHALL BE LEAK
386) TESTED, COMPONENTS MATCH MARKED AND THEN DISASSEMBLED FOR SHIPMENT.
387) COMPONENTS FOR FIELD ASSEMBLY SHALL HAVE GASKETED AND BOLTED FLANGED
388) CONNECTIONS. FIELD WELDED CONNECTIONS WILL NOT BE PERMITTED.
- 2 389) START-UP SERVICE
- 3 390) MANUFACTURER SHALL FURNISH A FACTORY-TRAINED SERVICE ENGINEER WITHOUT
391) ADDITIONAL CHARGE. REPRESENTATIVE SHALL SUPERVISE LEAK TESTING,
392) EVACUATION AND DEHYDRATION USING A HIGH VACUUM PUMP FURNISHED BY THE
393) MANUFACTURER, CHARGING THE UNIT, START-UP AND INSTRUCTION OF
394) GOVERNMENT'S PERSONNEL ON OPERATION AND MAINTENANCE. MANUFACTURER
395) SHALL PROVIDE OPERATING INSTRUCTIONS AND PARTS LIST. REFER TO SPECIAL
396) CONDITIONS.

***END OF SECTION